

Unilateral Pulmonary Edema (UPE) Secondary to Mitral Regurgitation (MR)

P. Tansey¹, B. Dalton² J. Meaney³

1. Dept. of Radiology, St James's Hospital, Dublin.
2. Centre for Advanced Medical Imaging (CAMI),
St. James's Hospital, Dublin.
3. Dept. of Radiology, St James's Hospital, Dublin.

Abstract

Presentation

86-year-old female who was admitted from clinic with haemoptysis on a background of known solitary pulmonary nodules, right basal pneumonitis and congestive cardiac failure.

Diagnosis

The patient underwent a Computed Tomography (CT) scan of the thorax which showed right lower lobe septal thickening with ground-glass attenuation, nodular areas of consolidation and pulmonary vein expansion. The appearance is probably most in keeping with mitral regurgitation (MR) into the right lower lobe. An echocardiogram showed a normal systolic LV function EF 55% however the mitral valve showed some calcium deposition of the posterior annulus in keeping with moderate mitral regurgitation, bilateral dilatation of the atria was also noted.

Treatment

The patient was commenced on IV diuresis-60mg BD of Furosemide and improved clinically. She will undergo an outpatient Transoesophageal Echocardiogram to the investigate the mitral valve further.

Conclusion

UPE is a rare manifestation and is often mistaken for pneumonia, alveolar haemorrhage aspiration or other causes of unilateral infiltrate. A delay in diagnosis and ultimately treatment can lead to poorer outcomes thus immediate and accurate diagnosis is crucial.

Introduction

We present a case of an 86-year-old female who was admitted from respiratory clinic with haemoptysis on a background of known solitary pulmonary nodules, right basal pneumonitis, and congestive cardiac failure.

Case Report

The patient underwent a computed tomography (CT) scan of the thorax which showed right lower lobe septal thickening with ground-glass attenuation with nodular areas of consolidation. In addition, the pulmonary veins are expanded, and foci of calcification are present. The appearance is probably most in keeping with mitral regurgitation (MR) into the right lower lobe. Inflammatory markers were within normal limits and there was no further suggestion that this was an infective process. Lymphangitis could also have this appearance although there is no history of malignancy (Figure 1).



Figure 1: CT Thorax selective coronal slice depicting right lower lobe septal thickening with ground-glass attenuation with nodular areas of consolidation.

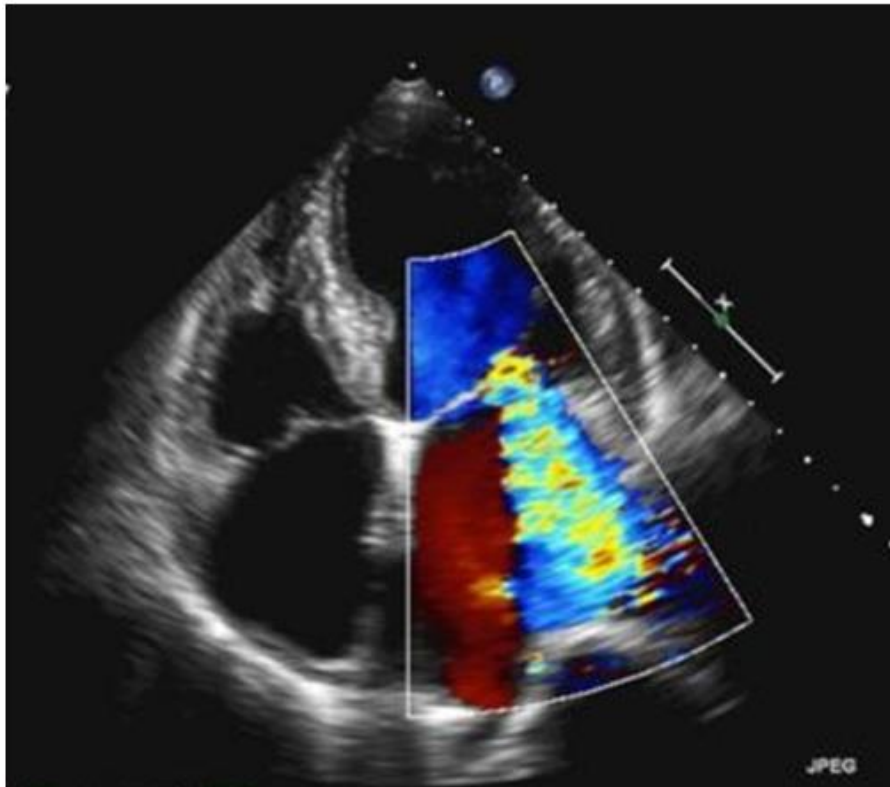


Figure 2: Echocardiogram, four chamber apical view with colour doppler showing moderate mitral regurgitation jet.

An echocardiogram showed a normal systolic LV function EF 55% however the mitral valve showed some calcium deposition of the posterior annulus, which is commonly associated with moderate mitral regurgitation, in addition, there was no evidence of stenosis. Bilateral dilatation of the atria was also noted. (Figure 2). The patient was commenced on IV diuresis-60mg BD of Furosemide and improved clinically. She was discharged on an increased dose of PO Furosemide 60mg BD. She will undergo an outpatient Transoesophageal Echocardiogram to investigate the Mitral valve further.

Discussion

Pulmonary oedema is one of the most commonly encountered pathologic processes in chest radiology. The aetiology of pulmonary oedema can be divided into cardiogenic and non-cardiogenic. Cardiogenic pulmonary oedema (increased hydrostatic pressure) produces a non-inflammatory type of oedema by the disturbance in Starling forces. Clinical features include dyspnoea, tachypnoea, orthopnoea, tachycardia, and hypoxemia.

UPE accounts for only 2% of cardiogenic pulmonary oedema and has a strong association with severe mitral regurgitation (MR)^{1,2}. MR occurs when the mitral valve fails to close completely during ventricular systole. Haemoptysis is an uncommon symptom of CHF. It is hypothesised that the reason for haemoptysis in MR is due to the pressure change within the left atrium being directed back into the pulmonary circulation, leading to blood leakage from the capillaries^{5,6}.

UPE is often misdiagnosed as pneumonia, aspiration, or alveolar haemorrhage and thus lead to a false diagnosis of pneumonia and so delay management. The mortality rate of UPE is twice as high as that of bilateral pulmonary oedema due to initial misdiagnosis and delayed treatment⁷. There are several theories on the mechanism of UPE however the direction of regurgitation was the most probable cause in this case.

UPE is more common on the right, this is because the mitral regurgitation jet is predominantly directed towards the upper right pulmonary vein thus causing a larger increase in mean capillary pressure on the right side³. Incompetent valves lead to blood being directed retrogradely into the left atrium. Overtime this causes the left atrium to become dilated and blood to reenter the pulmonary veins, leading to pulmonary oedema⁴.

Declaration of Conflicts of Interest:

The authors declare no conflict of interest in preparing this article.

Corresponding Author:

Dr Paul Tansey,
Specialist Radiology Registrar,
Radiology Department,
St. James Hospital,
Dublin 8,
Ireland.
E-Mail: ptansey@tcd.ie

References:

1. Kradin R. Understanding Pulmonary Pathology.
2. Staub N. The pathophysiology of pulmonary edema. *Hum Pathol.* 1970;1(3):419-432. doi:10.1016/s0046-8177(70)80075-2
3. Attias D, Mansencal N, Delos A et al. Response to Letter Regarding Article, "Prevalence, Characteristics, and Outcomes of Patients Presenting With Cardiogenic Unilateral Pulmonary Edema". *Circulation.* 2011;123(20). doi:10.1161/circulationaha.110.017590
4. Miyatake K, Nimura Y, Sakakibara H et al. Localisation and direction of mitral regurgitant flow in mitral orifice studied with combined use of ultrasonic pulsed Doppler technique and two dimensional echocardiography. *Heart.* 1982;48(5):449-458. doi:10.1136/hrt.48.5.449
5. Legriel S, Tremey B, Mentec H. Unilateral pulmonary edema related to massive mitral insufficiency. *Am J Emerg Med.* 2006;24(3):372. doi:10.1016/j.ajem.2005.10.023
6. Marak C, Joy P, Gupta P, Bukovskaya Y, Guddati A. Diffuse Alveolar Hemorrhage due to Acute Mitral Valve Regurgitation. *Case Rep Pulmonol.* 2013;2013:1-5. doi:10.1155/2013/179587
7. Attias D, Mansencal N, Auvert B et al. Prevalence, Characteristics, and Outcomes of Patients Presenting With Cardiogenic Unilateral Pulmonary Edema. *Circulation.* 2010;122(11):1109-1115. doi:10.1161/circulationaha.109.934950